

WE CLAIM:

1. A method for automatic valve characterization of digital valve positioners, comprising the steps of:

5 determining a minimum travel position of a valve through which fluid is to flow in a controllable process;

inputting a control signal at an initial value to a digital valve positioner that controls a travel position of the valve in response to a value of the control signal, the initial value of the control signal corresponding to the minimum travel position of the valve and a respective amount of flow to define a minimum operating point;

10 increasing the value of the control signal input to the digital valve positioner from the initial value to move from the minimum operating point through a series of operating points having respective control signal values, travel positions and amounts of flow, the series ending in a highest operating point defined by a highest travel position used thus far in the controllable process and the respective control signal value and respective amount of flow;

for each operating point, storing at least the respective travel position and amount of flow;

20 automatically generating a graphical straight line fitted between a point represented by the minimum travel position and its respective amount of flow and a point represented by the highest travel position and its respective amount of flow; and

using the straight line as a modified installed flow characteristic for the valve to control the controllable process.

2. The method of claim 1, wherein the minimum travel position is zero travel.

3. The method of claim 1, wherein the highest travel position is a highest position to be used in the controllable process.

4. A method for automatic valve characterization of digital valve positioners, comprising the steps of:

inputting a control signal at an initial value to a digital valve positioner that controls a travel position of a valve in response to a value of the control signal, wherein fluid is to flow through the valve in a controllable process, the initial value of the control signal corresponding to a first travel position of the valve and a respective amount of flow to define a first operating point;

changing the value of the control signal input to the digital valve positioner from the initial value to move from the first operating point through a series of operating points having respective control signal values, travel positions and amounts of flow, the series ending in a second operating point defined by a second travel position used thus far in the controllable process and the respective control signal value and respective amount of flow;

for each operating point, storing at least the respective travel position and
amount of flow;

automatically generating a graphical straight line fitted between a point
represented by the first travel position and its respective amount of flow and a point
5 represented by the second travel position and its respective amount of flow; and

using the straight line as a modified installed flow characteristic for the valve
to control the controllable process.

5. The method of claim 4, wherein the minimum travel position is zero
10 travel.

6. The method of claim 4, wherein the second travel position is a highest
position to be used in the controllable process.

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7. A method for automatic valve characterization of digital valve positioners, comprising the steps of:

determining a minimum travel position of a valve through which fluid is to flow in a controllable process;

5 inputting a control signal at an initial value to a digital valve positioner that controls a travel position of the valve in response to a value of the control signal, the initial value of the control signal corresponding to the minimum travel position of the valve and a respective amount of flow to define a minimum operating point;

increasing the value of the control signal input to the digital valve positioner
10 from the initial value to move from the minimum operating point through a series of operating points having respective control signal values, travel positions and amounts of flow, the series ending in a highest operating point defined by a highest travel position used thus far in the controllable process and the respective control signal value and respective amount of flow;

15 for each operating point, storing at least the respective travel position and amount of flow;

automatically generating a graphical straight line fitted between a point represented by the minimum travel position and its respective amount of flow and a point represented by a selected travel position and its respective amount of flow; and

20 using the straight line as a modified installed flow characteristic for the valve to control the controllable process between the minimum travel position and the selected travel position.

8. The method of claim 7, wherein the minimum travel position is zero travel.

9. The method of claim 7, wherein the selected travel position is a highest
5 position to be used in the controllable process.

10. A method for automatic valve characterization of digital valve positioners, comprising the steps of:

determining an approximate middle point of an installed flow characteristic of
10 a valve through which fluid is to flow in a controllable process based upon an inherent flow characteristic of the valve;

establishing a straight line as a predetermined modified installed flow characteristic for the valve; and

using the straight line as the modified installed flow characteristic for the valve
15 to control the controllable process, the straight line passing through the middle point of the installed flow characteristic to limit a maximum required correction and maintain high resolution.

11. Apparatus for automatic valve characterization of digital valve
20 positioners, comprising:

establishing a control loop including a valve through which fluid is to flow in a controllable process, a digital valve positioner that controls a travel position of the

valve in response to a value of an input control signal, and a controller for inputting the control signal to said valve positioner,

said valve having a determined minimum travel position in the controllable process,

5 said control signal having a value that controls a travel position of said valve, an initial value of said control signal corresponding to said minimum travel position of said valve and a respective amount of flow to define a minimum operating point;

 said controller being operable to increase the value of said control signal input to said digital valve positioner from said initial value to move from the minimum
10 operating point through a series of operating points having respective control signal values, travel positions and amounts of flow, said series ending in a highest operating point defined by a highest travel position used thus far in the controllable process and the respective control signal value and respective amount of flow,

 wherein, for each operating point, said valve positioner stores at least the
15 respective travel position and amount of flow and automatically generates a graphical straight line fitted between a point represented by said minimum travel position and its respective amount of flow and a point represented by said highest travel position and its respective amount of flow, and

 said controller using the straight line as a modified installed flow characteristic
20 for said valve to control the controllable process.

12. The apparatus of claim 11, wherein the minimum travel position is zero travel.

13. The apparatus of claim 11, wherein the highest travel position is a
5 highest position to be used in the controllable process.

14. Apparatus for automatic valve characterization of digital valve positioners, comprising:

establishing a control loop including a valve through which fluid is to flow in a
10 controllable process, a digital valve positioner that controls a travel position of the valve in response to a value of an input control signal, and a controller for inputting the control signal to said valve positioner,

said valve having a determined first travel position in the controllable process,
said control signal having a value that controls a travel position of said valve,
15 an initial value of said control signal corresponding to said first travel position of said valve and a respective amount of flow to define a first operating point;

said controller being operable to change the value of said control signal input to said digital valve positioner from said initial value to move from the first operating point through a series of operating points having respective control signal values,
20 travel positions and amounts of flow, said series ending in a second operating point defined by a second travel position used thus far in the controllable process and the respective control signal value and respective amount of flow,

wherein, for each operating point, said valve positioner stores at least the respective travel position and amount of flow and automatically generates a graphical straight line fitted between a point represented by said first travel position and its respective amount of flow and a point represented by said second travel position and its respective amount of flow, and
5 said controller using the straight line as a modified installed flow characteristic for said valve to control the controllable process.

15 15. The apparatus of claim 14, wherein the minimum travel position is zero travel.
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16. The apparatus of claim 14, wherein the second travel position is a highest position to be used in the controllable process.

15 17. Apparatus for automatic valve characterization of digital valve positioners, comprising:

 establishing a control loop including a valve through which fluid is to flow in a controllable process, a digital valve positioner that controls a travel position of the valve in response to a value of an input control signal, and a controller for inputting
20 the control signal to said valve positioner,

 said valve having a determined minimum travel position in the controllable process,

said control signal having a value that controls a travel position of said valve,
an initial value of said control signal corresponding to said minimum travel position
of said valve and a respective amount of flow to define a minimum operating point;

said controller being operable to increase the value of said control signal input
5 to said digital valve positioner from said initial value to move from the minimum
operating point through a series of operating points having respective control signal
values, travel positions and amounts of flow, said series ending in a highest operating
point defined by a travel position used thus far in the controllable process and the
respective control signal value and respective amount of flow,

10 wherein, for each operating point, said valve positioner stores at least the
respective travel position and amount of flow, and

for each operating point, said valve positioner automatically generates a
graphical straight line fitted between a point represented by said minimum travel
position and its respective amount of flow and a point represented by the travel
15 position and its respective amount of flow for the respective operating point, and

said controller using the straight line as a modified installed flow characteristic
for said valve to control the controllable process between the minimum travel position
and the selected travel position.

20 18. The apparatus of claim 17, wherein the minimum travel position is zero
travel.

19. The apparatus of claim 17, wherein the highest travel position is a highest position to be used in the controllable process.

20. A method for automatic valve characterization of digital valve positioners, comprising the steps of:

5 using a standard control valve in combination with a digital valve positioner and differential pressure transmitter to generate an actual flow signal indicative of fluid flow through the valve over a range of travel positions of the valve in a controllable process; and

10 using the actual flow signal directly in a feedback loop of the valve positioner to operate the valve with a linear relationship between a control signal to the valve positioner and the flow through the valve.